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**Utility Patent Application**

**CONFIDENTIAL INFORMATION**

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Patent Application based on: Docket No. 04-1595  
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**Device for Banding**

**Stacks of Bank Notes**

**RELATED APPLICATIONS**

The present invention claims the priority of PCT application 03/00118 filed in Russia on March 25, 2003. The entire disclosure and contents of the above application is hereby incorporated by reference.

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**BACKGROUND OF THE INVENTION**

1. **Field of the Invention**

The present invention relates generally to an improved device for banding stacks of bank notes and, more specifically, to a device that tightly bands stacks with prefabricated paper rings of which the perimeter of the ring precisely corresponds with the perimeter of a pile of bank notes.

2. Description of the Related Art

As is well known in the art, there are a series of devices provided to band stacks (stubs) of securities. Typically, these devices apply strips to stacked banknotes and hold them together. A search of the prior art did not disclose any 5 patents that read directly on the claims of the instant invention; however, the following references were considered related.

Of considerable relevance is the loop-making device disclosed in RU2123426 C2 to Aleksandrov et al., which comprises a body, a band drive unit with a reel-holder, and a pipe and a sensor that determines the length of band 10 and looping unit. The device also comprises a welding mechanism with a welding head, a knife for cutting the band, mechanism drives and a control unit.

The looping device is comprised of a stage for arranging a stub that is assembled with the possibility of rotation relative to the horizontal axis. The stage includes an arbor, a spring-loaded clamping arm and a tooth gear. The 15 swinging stage clamps the end of the band with the spring-loaded arm. The stage also serves to place the band in loop formation. The lower surface of the stage is intended to form a welding seam. The welding mechanism is comprised of a welding head, the advance of which is performed by means of a cam gear. The looping and welding gears have a common drive, on the arbor of which are placed the cams of each gear and a program disk connected to the control unit. 20

The disadvantages of this construction include the comparatively inefficient production of the device, due to the complex process of loop-forming. Loop-forming consists of several stages, including a preliminary and a final stage, as required because of the necessity of precise positioning of the individual units and elements of the device.

A more efficient device for banding stubs of bank notes is disclosed in RU 2166466 C1 to Aleksandrov et al., of which the device is comprised of a body, a band drive unit with a reel-holder, a pipe and a sensor with an obturator disk to determine the length of the band, a looping device with a stage, welding gear with a welding head, a knife for cutting the band and gear drives. The looping unit is comprised of a pipe, bounded with walls, which has the shape of a loop and at the same time, the stage for the sub is fixed inside it. The welding gear, located on the body, is equipped with both mechanical transfer for reciprocating drift and a couple of clamps. The knife is mounted in the body of the welding unit. The reel-holder, in the shape of a chute, is placed in the upper part of the body over the looping pass. The welding gear is located in the body directly under the stage of the looping unit and is equipped with a program bar that consists of a sensor of linear drift connected to the control unit.

A disadvantage to this device is that it doesn't provide for the possibility of banding a stack of bank notes with the help of a prefabricated ring, of which the perimeter of the ring precisely corresponds with the perimeter of a pile of bank

notes. This disadvantage causes the device to be less efficient. The device is based on a complex movement of band, of which the process of banding a loop consists of tightening the loop and cutting off the band. A complex reversing band unit drive is required to accomplish this step. An obturator unit is also required to precisely count the band length. A complex mechanism of band welding is another necessary piece of the device. Thus, the device is rather complicated, isn't sufficiently efficient, and provides for the banding of a stack of bank notes only with the use of welding that is plastic (i.e., polyethylene band).  
5 The use of paper bands or prefabricated paper rings is not possible when utilizing this device.  
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Consequently, a need has been felt for providing an improved device for tightly banding stacks of bank notes using prefabricated paper rings of which the perimeter of the ring precisely corresponds with the perimeter of a pile of bank notes  
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#### SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide an improved device and method for banding stacked bank notes, a device that is less complicated, more reliable, and more efficient.

In accordance with a preferred embodiment, the device in the present  
20 invention comprises a body, a container having a box-like structure for packing material, a means for feeding the packing material and an element for arranging

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*The packing material consists of*  
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the stack of bank notes. Band rings are stacked flat in the container. The element of the device that feeds the packed material is comprised of a pick-up unit and a displacement mechanism. The element for arranging the stack of bank notes is embodied in such a way that the stack of bank notes is deformed along the longitudinal axis. A sensor defines the position of the stack. The element is also coupled to a displacement mechanism provided with a pick-up unit used to displace the element. The element for arrangement and the container for the packing material, made in the form of band rings, are mounted on the body with respect to each other in such a way that the deformed stack of bank notes is introduced in a ring taken from the container. The element for arrangement, having a tubular casting, converges from the inlet to the outlet and has a side cut along its full length. The deformation of the banknote pile occurs at its motion along the tubular casting, and removal of the bank note is effected through the side cut.

10 It is a feature of the present invention to provide an improved method of effectively banding stacks of bank notes with the use of prefabricated paper rings. The portions of the prefabricated rings correspond with the dimensions of the stack. As a result, the ring tightly envelopes the stack. The procedure for banding is extremely simplified and the time for banding is reduced to a minimum.

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BRIEF DESCRIPTION OF THE DRAWINGS

The advantages and features of the present invention will become better understood with reference to the following more detailed description and claims taken in conjunction with the accompanying drawings, in which like elements are identified with like symbols, and in which:

5 FIG. 1 shows a perspective schematic front view of the device for banding stacks of bank notes in accordance with the present invention.

FIG. 2 shows a perspective schematic right-side view of the device in Fig. 1 in accordance with the present invention.

10 FIG. 3 shows a schematic of the element for arranging the stack of bank notes on a larger scale.

FIG. 4 shows a schematic of the element for arranging the stack of bank notes including an arranged stack of bank notes.

15 FIG. 5A shows a schematic front view of the container for packing material.

FIG. 5(b) shows a schematic of the device for feeding the packing material.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

20 The best mode for carrying out the invention is presented in terms of its preferred embodiment, herein depicted within the Figures.

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1. Detailed Description of the Figures

The device for banding stacks of bank notes according to the present invention comprises a body 1 and a container 2, having a box-like structure, opened in the bottom. Packing material in the form of flattened paper rings 3 is stacked in the container.

5 The device for feeding the packing material is comprised of an element 4 with a pick-up unit in the form of a roller 5, on the outer surface of which is reeled an adhesive tape. The adhesive layer faces outwards.

10 The mechanism of displacement of the element with the roller 5 comprises an arm 6 mounted on an axis 7. The arm 6 is firmly coupled with the element 4. The element for arranging the stack of bank notes is positioned in such a way to deform the notes relative to the longitudinal axis. In the specific embodiment, it is made in the form of a tubular casing 8, which converges from the inlet 9 to the outlet 10. The tubular casing 8 has a side cut 11 along its full length from the inlet 9 to the outlet 10. The tubular casing 8 is equipped with a sensor for defining the position of the stack of bank notes. An arm 12 that rotates relative to the axis 13 is coupled to a mechanism for displacing the element 4 with the roller 5 by means of a mechanic gear, which comprises a pressure element 12, installed on the axis 13, and a spring-loaded plate 15, attached to the arm 6. The return of the arm 6 to the original position is provided with the help of a spring 16. In the lower part of the container 2, on the edges of

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its outlet, are placed the <sup>rests</sup> 18.

## 2. Operation of the Preferred Embodiment

In operation, the present invention consists of a stack 17 of bank notes that is fed through the inlet 9 of the tubular casing 8, which has relatively larger proportions in comparison to the outlet 10. The stack 17 of bank notes is deformed (refer to Fig. 2), and its ends come out from the outlet 10 of the tubular casing 8. Movement inside the tubular casing 8 causes the stack 17 of bank notes to press the sensor for defining the position of the stack of notes, the sensor having an arm 12 that rotates relative to the axis 13. The pressure element 14 then turns and presses the spring plate 15, which is attached to the arm 6. The arm 6 turns downward relative to the horizontal axis 7, and together with it turns the element 4 with the roller 5. If a stack of bank notes is not available inside the tubular casing 8, the spring 16 adjusts to the lower of the rings 3 positioned in the container 2. When the roller 5 moves downwards, turning with the element 4 and the arm 6 relative to the axis 7, it drags the ring 3 by means of the adhesive tape layered on the outward surface. The ring converts from its flattened condition inside the container to an unfolded state (refer to Fib. 5), and it is restrained in this state owing to the fact that the upper part of the ring is held by the rests 18 while the lower part of the ring is pulled down by the roller. At this time, the stack 17 of bank notes, which came out from

the outlet 10 of the tubular casing 8, forms into the ring 3. The stack of bank notes is removed from the ring 3 to the right through the cut 11 in the tubular casing 8 (refer to Figs. 1, 2 and 5):

The ring 3 stays on the stack of bank notes and bands the stack tightly.

5       The device returns to the original position with the help of the spring 16. The device is then ready to band the next stack of bank notes. The procedure of first feeding the stack of bank notes in the tubular casing 8, and then removing the stack from the tubular casing through the cut 11, can be effected manually or it can be automated with the help of a simple mechanism.

10      The foregoing descriptions of specific embodiments of the present invention have been presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the invention to the precise forms disclosed, and obviously many modifications and variations are possible in light of the above teaching. The embodiments were chosen and described in order to best explain the principles of the invention and its practical application, to thereby enable others skilled in the art to best utilize the invention and various embodiments with various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the Claims appended hereto and their equivalents. Therefore, the scope of the invention is to be limited only by the following claims.

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